specification[1] and Reshef et al (U.S. Patent No. 5,094,520). This rejection continues to be traversed.

Brief Descriptions of Prior Art and Present Invention

Volk

The Volk patent describes an ophthalmic lens of changing power having a convex aspheric surface useful for the correction of presbyopia, rather than myopia or hyperopia. It includes an ordinary toric or spherical back surface and a unique front surface referred to as a "accelerating surface" in the Volk patent. *See* column 1, lines 22-30. The front surfaces have meridian sections that are all elliptical arcs, rather than having no meridians as elliptical arcs on the front surface of the lens. This accelerating surface has elliptical arcs which are used in conjunction with suitable inclinations of a circle of a given diameter. See Figure 1 and the description related thereto, including column 2, lines 1-15, for example. The accelerating surface is said to be formed with a mold at column 3, lines 15 and 16.

The basic lens design is shown in Figure 6, but before describing the basic lens design, it is noted that the dioptic power of the astigmatism of the accelerating surface is compensated for the lens thickness and actual dioptic power which the tool grinds the back surface, as disclosed at column 7, lines 58-62. As disclosed at column 9, line 64 through column 10, line 2 and column 10, lines 26-29, the inner surface or back surface of the finished workpiece is ground and polished to a precise standard negative curvature, each specific base curve and add requiring a specific negative inner, or back, surface to produce a semi-finished lens.

[1] Paragraph numbers refer to Applicants' specification as published in PG Pub. 2004-009972.

As shown in Figure 6, and as identified in Applicants' previous response, the radius of the curvature of the lens shown would be approximately 106 mm, using a simple ruler to measure the radius of the front surface by connecting the two chain link lines. Also, the hollow depth of the lens is less than 6 mm. Hence, as described in the present application, the Volk lens appears to be an Ostwalt section lens. The vast majority of conventional prescription lenses are relatively flat, single vision, Ostwalt section lenses such as disclosed in the Volk patent.

Reshef et al

Reshef et al discloses goggle lenses which have a radius of 24.13 mm and 24.87 mm for inside and outside surfaces, respectively. They are apparently being applied as allegedly teaching steeply curved lenses.

Paragraphs 8, 9 and 38 of Applicants' Specification

Applicants essentially identified the type of lenses shown in the Volk patent as well as the existence of steeply curved lenses in the following paragraphs [0008, 0009], as well as elsewhere in the present specification.

> The lower portion 10 of the ellipse is the so-called "Ostwalt section" which describes a selection of relatively flat front surfaces for lens powers typically used in conventional prescription ophthalmic lenses. The upper portion 12 of the curve, called the "Wollaston section", describes much more steeply curved lenses which have never gained acceptance as lens forms, although there are historical instances of attempts to make such objects (*e.g.* Wollaston himself). *See, M. Jalie, The Principles of Ophthalmic Lenses* p. 464 (4th Ed. London, 1994). Because of difficulties in fabrication, such early lenses were probably of small aperture and, consequently, perhaps, regarded as unacceptable for cosmetic reasons and because of their limited field of view.

> Modern lenses with steeply curved front spherical surfaces have been made for the treatment of aphakia (absence of the natural lens of the eye as in the case of surgical removal of the lens). The general form of these lenses is shown in Figure 2. *See M. Jalie* at p. 151. Such lenses serve essentially as an eye lens replacement and are characterized by great thickness and high plus power (greater than +5 D and typically +12 D or greater). The aperture A of these lenses are of small size *e.g.* 26 or 28 mm in diameter. Typically such aphakic lenses have a plano radial flange 14.

Also, astigmatism correction is discussed in paragraph [0038] of the present application as follows:

> Conventional astigmatism correction is based on toroid surfaces often described in terms of principle meridia, *i.e.* orthogonal meridia centered at the optical axis of the lens, representing the locus of maximum and minimum curvatures. Barrel toroids and donut toroids have both been used to provide cyl corrections. As described below, Applicants have developed novel astigmatism correcting surfaces for steeply curved lens, which surfaces can be described as lying between a barrel toroid and donut toroid each having the same principle meridia and the same power along the principle meridia. Two such surfaces are the "all-circular meridia" surface and the "averaged-toroids" surface described in detail below.

Arguments

In order to understand why Applicants believe the present claims to be patentable, after review of the Office's reasoning for denying patentability, it is useful to first contemplate the necessary logical steps for modifying the applied art to achieve the presently claimed invention, and then examine further factors that indicate that the present invention is not obvious from the applied prior art.

Modifications necessary to Volk to achieve the present invention

As noted above, the Volk patent discloses what could be fairly characterized as an Ostwalt section lens. As described in Applicants' description of applicable art,

quoted above, Ostwalt lenses have been the typical and common lens because they are relatively flat and more easily fabricated. In contrast, the present claims recite a method of making a steeply curved lens element having a non-zero prescription through power. More specifically, the lens blank is molded, having a radius of curvature along a principle meridian of less than 35 mm over a substantial portion of the front surface thereof. This is in contrast to the 109 mm front surface of the Ostwalt lens shown in Volk. This makes it a steeply curved lens which can be fairly described as a Wollaston section lens, which is decidedly unpopular and generally regulated to such specific applications as for the treatment of aphakia (the absence of a natural lens, as in the case of surgical removal of the lens). *See* paragraph 0009 of the present application. Hence, one skilled in the art in reading the Volk patent would have to abandon the convention of using an Ostwalt section lens but instead go to the other side of the so-called Tscherning's ellipse to the decidedly unpopular Wollaston section lens. The reasons suggested in the Office Action for dramatically shifting away from over 100 years of precedence from Ostwalt lenses to the other side of the Tscherning's ellipse, are: (1) that the variation "surely would have been obvious" as identified at page 2, (2) that the "instant radius of curvature is well known in the art" without citation to authority and, (3) finally, "that one of ordinary skill would have modified the method of Volk to arrive at such desiring a lens with that curvature." If one were to accept this standard of patentability in the lens art, then one may properly question why hundreds, if not thousands, of lens design patents have issued and whether the Office is now indicating that all of those issued patents are invalid.

Problems with steeply curved lenses

The Office suggests that "there is nothing of record to indicate any problems concerning molding of steeply curved lenses" or that such would necessarily be problematic. Applicants respectfully disagree. As identified at several locations in the present application, a number of problems arise. For instance, as identified in paragraphs 12-24 for instance (under the section "Objects and Advantages of the Invention"), it is described that there are problems of fabrication and distortion and problems of producing a range of common plus or minus power prescriptions with or without available common astigmatism correction or "cy1" prescriptions. For instance, Wollaston lenses present a problem in that they would be made for a wide range of front surface powers if one were to provide a range of common prescription powers. To provide the power range from +5D to -8D, the front surface curvature from about 29 to about 39 mm would be required. This represents a large variation in the overall size and shape of lenses. Such lenses cannot be fitted like panes into a single frame size but in fact each prescription would dictate its own specialized frame size and style, and thus not conducive to mass marketing.

Additionally, the present invention is based, in part, on observations from a test designed by two of the inventors, Morris and Spratt. The Morris-Spratt diagram of Figure 4 illustrates that it is possible through the appropriate selection of lens parameters to fabricate high quality spherical lenses over a wide range of prescriptions using a single, steeply curved front surface or spherical reference surface or shell, as described in paragraph 0033. This observation is not apparent from the prior art and identification of the problem and its solution forms part of the present invention. As such, this lends patentability. *Eibel Process Co. v. Minnesota*

and Ontario Paper Co., 261 US 45 (1923); *In re Sponnoble,* 405 5.2d 578, 160 USPQ 237 (CCPA 1969); *In re Pechs*, 612 F.2d 1287, 204 USPQ 835 (CCPA 1980).

Further, it should be evident from paragraph 006 that wraparound lens designs such as the Reshef et al. goggle lens, are typically non-prescription. They have flat base curves, wrap and sometimes rake, and are achieved by rotating and/or translating the optical axis of the lens in the as-worn orientation. The line in sight of the wearer however deviates from the optical axis, and the optical performance is significantly degraded and peripheral vision is typically poor. Hence, simply rotating the lens around an increasing curvature is not nearly as simple as the Office would suggest, but instead creates any number of problems in the fabrication and optical performance of these lenses. Far from obvious, the present Applicants have designed lenses that the prior art of record clearly indicates to be problematic, and most importantly applied art fails to appreciate the insights that led to the presently claimed invention.

The hypothetical combination is non-obvious

It is further noted that Reshef et al is directed to goggle lenses having apparently no desired power, and it is not clear if the lenses create a great deal of distortion. However, it is clear from the first column of Reshef et al that a distinction should be drawn between flat Ostwalt lenses and lenses that have a short radius of curvature, as disclosed in the Reshef et al patent. In fact, Reshef et al. identified the optical aberrations are considerable in spherical lenses of low radius due to inner eye distance and other factors or variations between individuals causing aberration due to placement errors. It is reiterated that these are to be non-power lenses and